County Geologic Atlas Program

Minnesota Geological Survey and Minnesota Department of Natural Resources

Prepared for the Legislative Water Commission

October 2015

Introduction

This document summarizes the status of the County Geologic Atlas Program, a joint program of the Minnesota Geological Survey (MGS) and the Minnesota Department of Natural Resources (DNR). The MGS prepares the geology part of an atlas (Part A) and the DNR prepares the groundwater and pollution sensitivity part of an atlas (Part B). The MGS completes work on Part A first and then the DNR completes Part B. This document also includes our best estimate of how the work will advance in the years to come.

A County Geologic Atlas includes comprehensive geologic mapping and associated databases describing the geology of Minnesota. A complete atlas also includes maps and data describing groundwater resources.

The first County Geologic Atlas, Scott County, was published by the MGS in 1982. In the early 1990's the DNR joined the MGS to produce county geologic atlases. The first Part A/Part B atlas report was completed for Fillmore County in the mid-1990's. Since then, the MGS and the DNR have worked together in close collaboration.

Status

The attached County Geologic Atlas Status map shows counties with completed atlases, counties with atlases underway at the MGS, counties with atlases underway at the DNR, and counties with atlases that are being revised. It is the intention of the joint MGS and the DNR County Geologic Atlas Program to complete an atlas for every county in the state and to revise existing atlases as necessary. The revisions are especially important for projects that were completed before geographic information systems (GIS) were part of the MGS tool set. Scott County has been revised; Winona and several others are in the process of revision to include both Part A and Part B.

The attached status table lists the progress of atlas projects. In summary, there are

23 atlases completed, both Part A and B (includes 1 revision);
12 Part A atlases complete with 11 Part B underway (including 1 revision);
16 Part A atlases in progress (including 3 revisions);
18 Part B future starts; and
41 atlases remain to be started.

Steering Factors for New County Geologic Atlas Projects

The MGS has typically taken the lead on starting new projects because the products of Part A created by the MGS are essential for the DNR to prepare Part B of an atlas. Many factors are considered in determining which counties to approach for new projects.

Local Engagement

The benefits of geologic mapping to society are only achieved if there is a user committed to considering geology and hydrology in their decision-making. For that reason the County Geologic Atlas Program requires a component of local funding or service to initiate a project. Therefore, counties have significant influence on where the County Geologic Atlas program will initiate new projects. Local interest in a county geologic atlas is often influenced by unpredictable and unforeseen events that stimulate local interests to consider pursuing a county geologic atlas. Examples of those events include the siting of an ethanol plant, a new transportation corridor, proposal for a frac sand mine, or a lake level decline. When those local interests are engaged, the result is that atlas maps and data have users eager to put the information to work.

Efficiency and staffing

The MGS is also influenced by the efficiency of extending mapping work outward from recently completed projects to take advantage of staff familiarity with the geologic setting. Having multiple projects close to each other also improves staff interaction, scientific consensus, and logistical efficiency. The DNR atlas program benefits from the same plan.

The MGS is also constrained somewhat by the availability of staff with the particular geologic expertise required for each project. For example, the MGS has three or four geologists with decades of experience mapping igneous and metamorphic rocks. These rocks are an important feature of atlases in the northwestern two-thirds of the state where they occur beneath glacial sediment or at the land surface. The MGS also has an equal number of geologists skilled at mapping the sedimentary bedrock of the Twin Cities area and southeastern Minnesota. Too many projects in either setting would exceed our capacity. The timing of projects is arranged to balance these needs and keep the entire staff engaged.

Areas of Resource Concern

Both MGS and the DNR recognize the need to provide county geologic atlases in areas where water management issues, water quality problems, and pollution sensitivity call for more immediate attention. Shown along with the County Geologic Atlas status map is a DNR map showing areas with high density of permitted wells and the location of three Groundwater Management Areas with pilot projects underway. County geologic atlases are available or underway for most, but not all of those areas. Consideration of new atlas projects also take into account situations where the resource may not yet be stressed, but where decisions are being made that could affect the resource. In such cases, atlas products would support informed decision-making and resource management.

Cost-sharing

Whenever possible, the MGS uses federal cost-sharing programs to garner additional resources to pay for atlases. This does not affect steering, but does accelerate progress in the areas where it is applied.

Future Atlases

Local government in Mille Lacs, Cook, Steele, Ottertail, Clearwater, Beltrami, Itasca, Rock, Nobles, Pipestone, Lincoln, Lyon, and Lac Qui Parle counties have all expressed interest in a future atlas project. It can be expected that the atlas program will continue to have one or more projects in the area of the sedimentary bedrock of southeastern Minnesota, one or more update projects, and a few projects in western and northern Minnesota at any given time. Ideally, future atlas projects will build out from current projects (as mentioned above), but depending on local support and other considerations starting a new atlas project adjacent to a current project may not always be possible.

Funding

MGS

The MGS has been requesting funds from the DNR, Clean Water Land and Legacy Amendment (Clean Water Funds), and the Environment and Natural Resource Trust Fund (ENRTF) to provide the MGS approximately $1,750,000 per year to apply to this program. This would enable the MGS to complete about five counties per year, keeping in mind that geologic complexity, size, proximity, and other factors make counties more, or less, expensive than average. Currently, 41 counties do not yet have atlases started. That number of county atlases would require about 8 more years of funding plus three or four years to complete the work after funding was provided and the last projects initiated. The MGS is working at that pace now with 16 projects underway simultaneously and each project taking 3 or 4 years to complete. In a perfect world the MGS would complete Part A atlases for all counties in the state in about 12 years.

The MGS has been using $350,000 per atlas as an average cost for many years. Over the years the cost has risen, but it has been offset by increased cost-sharing with federal grants. The MGS has also increased the number and depth of scientific drillholes, but the cost has been offset with Clean Water Funds provided under our contract with the DNR. Current projects such as the atlases of Lake and St. Louis counties will be much more expensive due to size among other factors. It is expected that new atlases started in western Minnesota will have lower than average costs unless it is necessary to drill additional scientific drillholes where well record data is widely spaced or otherwise limited.

DNR

The County Geologic Atlas Program at the DNR is supported by mix of funding. The base program is funded by direct appropriation to the DNR (General Fund). Part of that direct appropriation is applied to a contract with the MGS for Part A atlas production. The DNR atlas

program is accelerated by ENRTF funding and further expanded by Clean Water Funds. The three sources together currently provide the DNR approximately $1,620,000 annually.

The cost per atlas at the DNR is similar to the MGS although the project expenses may be different. For example, each atlas project undertaken at the DNR collects groundwater samples for natural water chemistry and isotopes. The cost for laboratory analysis of these samples is about $35,000 per county with current laboratories contracts.

Access to County Geologic Atlases and Related Documents

Printed atlas reports are available from the Minnesota Geological Survey Map Sales Office at 612-626-2969. Digital maps and data of MGS atlas reports are available from the MGS website at http://www.mngs.umn.edu/county_atlas/countyatlas.htm . Digital maps and data of DNR atlas reports are available from the DNR website at http://www.dnr.state.mn.us/waters/groundwater_section/mapping/index.html . The websites link to each other so all data are accessible to users.

Outreach and Training

The MGS has created a User's Guide to Geologic Atlases http://hdl.handle.net/11299/166713 to support users who are not geologists or hydrologists, but are called upon to make decisions that affect water resources. The User's Guide has a section on ground water basics specifically related to Minnesota; a section that explains how county geologic atlases are made; and information on how to apply atlases to resource management and decision-making. The User's Guide is an attempt to increase the impact of the atlases. Anyone with an interest in the atlas program or an interest in the ground water resources of Minnesota would find this document useful.

The DNR has also undertaken work to assemble the DNR Part B atlas groundwater data onto statewide data layers for easier application to non-county based project areas, such as watersheds. The development of the statewide groundwater data layers would not be possible without the county-level data created for individual counties by both MGS and the DNR parts of the atlas program.

At the completion of each County Geologic Atlas project, local presentations and workshops are held to assist local partners in using the atlas maps and data in their area.

For More Information

If you have any questions about the County Geologic Atlas Program please call:
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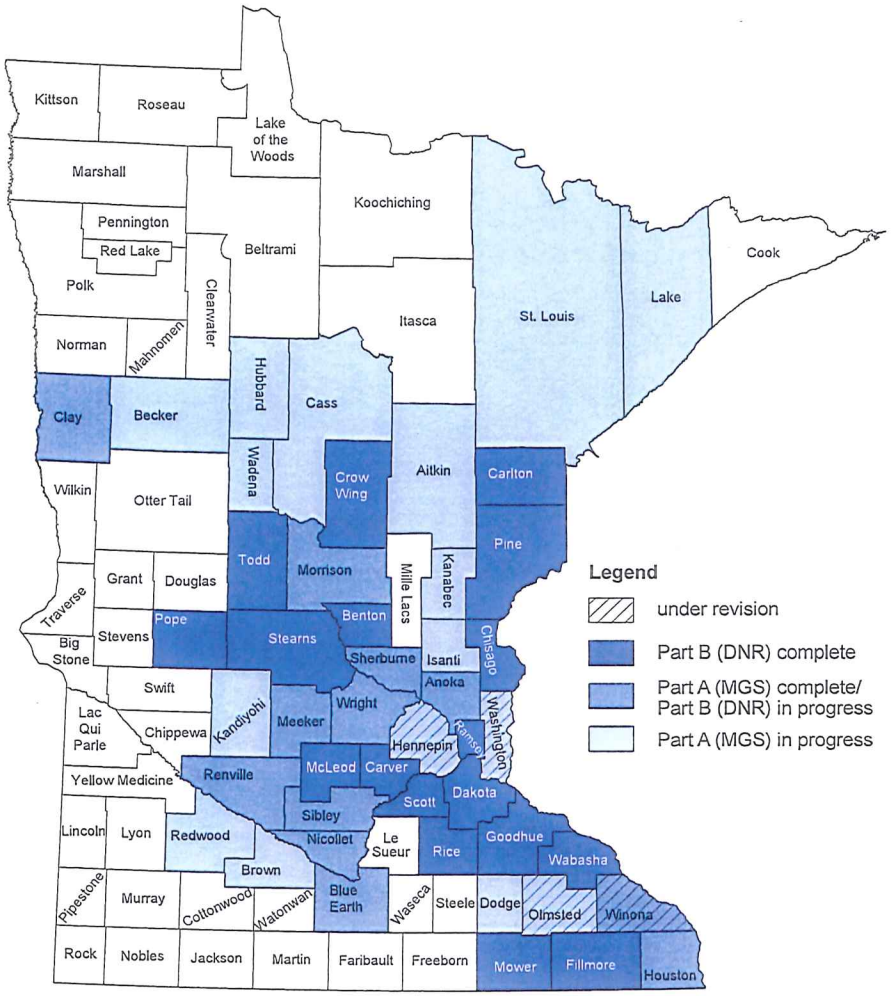
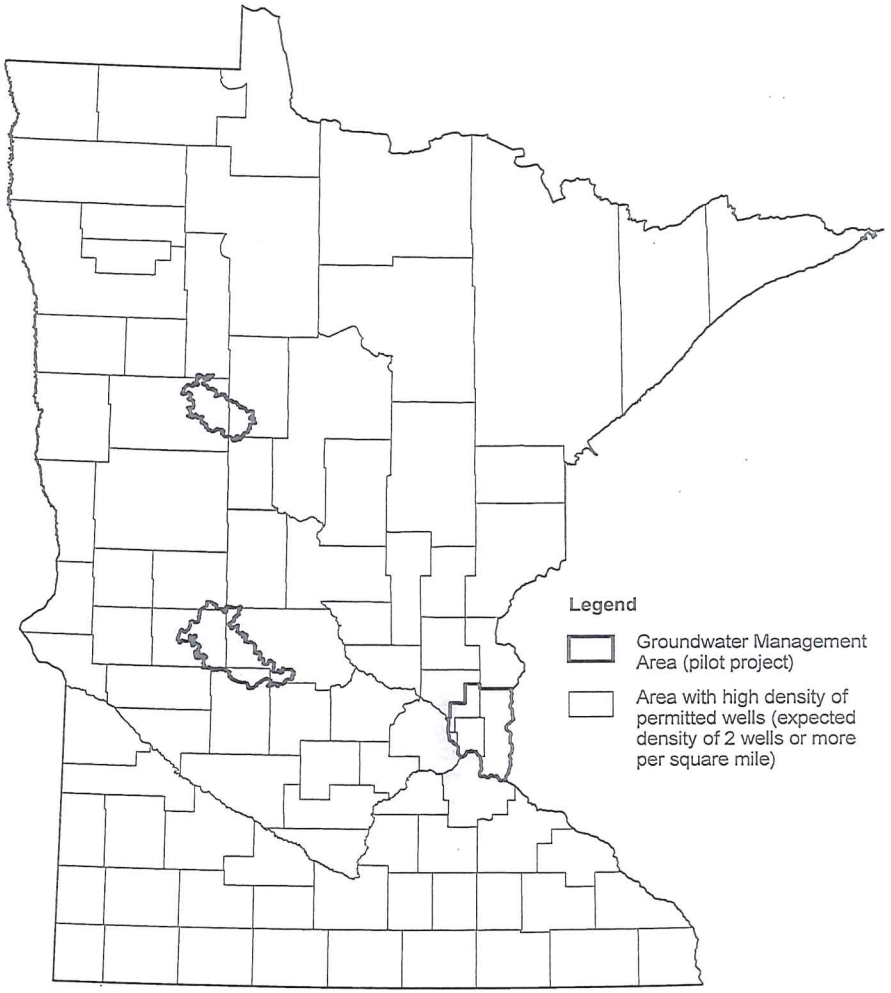
Attachments –
Map of County Geologic Atlas Program Status
Table of County Geologic Atlas projects

County Geologic Atlas Status
October 2015



Areas with High Density of Permitted Wells



MNDNR

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

CLEAN WATER LAND & LEGACY AMENDMENT

County Geologic Atlas Status
October 2015

Part A and B Complete

Atlas	County	Part A MGS Completed	Part B DNR Completed
C-01	Scott	1982	--
C-02	Winona	1984	--
C-03	Olmsted	1988	--
C-04	Hennepin	1989	--
C-05	Washington	1990	--
C-06	Dakota	1990	--
C-07	Ramsey	1992	--
C-08	Fillmore	1995	1996
C-09	Rice	1995	1997
C-10	Stearns	1995	1998
C-11	Mower	1998	2002
C-12	Goodhue	1998	2003
C-13	Pine	2001	2004
C-14	Wabasha	2001	2005
C-15	Pope	2003	2006
C-16	Crow Wing	2004	2007
C-17	Scott *Update*	2006	--
C-18	Todd	2007	2010
C-19	Carlton	2009	2011
C-20	Mcleod	2009	2013
C-21	Carver	2009	2014
C-22	Chisago	2010	2014
C-23	Benton	2010	2012

Part A Complete

Atlas	County	Part A MGS Completed	Part B DNR Projected Completion
C-24	Sibley	2011	2016
C-25	Nicollet	2011	2016
C-26	Blue Earth	2011	2015
C-27	Anoka	2012	2016
C-28	Renville	2013	2016
C-29	Clay	2014	2017
C-30	Wright	2013	2016
C-31	Morrison	2014	2017
C-32	Sherburne	2013	2017
C-33	Houston	2014	2017
C-34	Winona *Revision*	2014	2017
C-35	Meeker	2015	*future start*

Part A In Progress

Atlas	County	Part A MGS Projected Completion	Part B DNR Projected Start
C-36	Redwood	2015	2016
C-37	Brown	2016	2016
C-38	Kanabec	2015	2016
	Washington *Revision*	2015	2016
	Wadena	2016	2017
	Becker	2016	2017
	Hubbard	2016	2017
	Cass	2018	2018
	Isanti	2017	2018
	Hennepin *Revision*	2017	2018
	Dodge	2018	2018
	Olmsted Revision	2018	2019
	Kandiyohi	2019	2020
	Aitkin	2019	2019
	Lake	2019	*future start*
	St. Louis	2019	*future start*